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Development of Grow Out Techniques Utilizing the Water Column in Growing a Non Native Oyster (Crassostrea arikensis)

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FINAL REPORT

DEVELOPMENT OF GROW OUT TECHNIQUES UTILIZING THE WATER COLUMN IN GROWING A NON NATIVE OYSTER (crassostrea arikensis)

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This project addressed grow out techniques utilizing the water column in growing non native oysters (crassostrea arikensis) in a containerized manner. The purpose of this project was to evaluate the cost effectiveness of growing, in commercial quantities for the processing segment of the industry, a non- native oyster in different types of stackable trays suspended in the upper water column by a raft.

The original plan was to compare four different trays, however due to requirements by federal agencies bio security measures were implemented which eliminated two of the trays (2' x 2' x 8" both wire and plastic trays). All trays had been purchased prior to bio security measures being implemented. Attempts were made numerous times to exchange the unusable trays for additional usable trays, unfortunately the supplier would not exchange nor would the supplier allow a return for refund.

The project has shown that a non-native oyster can be grown in containers suspended in the water column by a raft without damage from harsh weather. However, oysters cannot be allowed to remain at the surface during the winter months when icing conditions are present. The trays must be lowered at least 12" below the surface to prevent oysters from freezing. Figure 1 shows the raft configuration by compartments. A comparison of the raft compartments showed no advantage of one compartment over another compartment. The top trays of compartments A through L were frozen during winter icing. Also, the top trays and some trays on the 2nd layer down in compartments M1 through R2 froze. Why some of the trays on the 2nd layer down froze and not other trays is unexplained.

Originally, the expected outcome of the project was that oysters on the surface would grow much faster than those on the bottom layer. This did not happen. Given the fact that ice killed the top layer it is assumed that based on the actual growth results of the remaining descending layers the top layer would not have grown as expected. Shell length along with meat yield increased, as can be seen from figures 2,3,4 and 5, as the distance from the surface increased. This was very surprising and leads one to believe the

animal may grow better on the bottom or just off the bottom rather than higher in the water column.

The results of the two types of trays used were very similar for shell growth, as can be seen from figure 4. However, the true cost effectiveness for the processing industry is determined by meat yield produced from each type of tray. Figure 5 shows the average meat yield per layer for each type of tray while figure 6 shows the total meat produced from each type of tray. As can be seen from figure 6 the higher meat yield was produced from the 40" x 20" x 4' 5 bag tray. This tray produced 22.9% more meat yield than the 3' X 4' X 6" 2 bag tray. In addition to having a greater meat yield this type of tray was easier to use. Mortality, with the exception of ice mortality, was insignificant in each of the two types of trays,

This type of system is cost effective for the processing industry since it will increase the overall harvestable yield as opposed to uncontainerized bottom culture and would work best in protected areas and not in areas where there is a lot of wave action.

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FIGURE # 1

RAFT CONFIGURATION BY COMPARTMENTS

A through L compartments pertain to the 40" X 20" 4' (5 Bag Trays)
M1 through R2 pertain to the 3' X 4' X 6" (2 Bag Trays).

A	B	C	D	E
J	I	H	G	F
K				L
N1	N2	M1	M2	
O1	O2	P1	P2	
R1	R2	Q1	Q2	

FIGURE # 2

Actual Shell Length and Meat Weight for the 40" X 20" X 4' (5 Bag Trays)

	SHELL LENGTH	MEAT WEIGHT
By Compartment:		
A	72.06mm	7.60lbs
B	73.85mm	8.14lbs.
C	71.80mm	7.39lbs.
D	73.36mm	8.04lbs.
E	72.14mm	8.46lbs.
F	71.66mm	10.12lbs.
G	78.14mm	7.50lbs.
H	76.89mm	7.45lbs.
I	77.10mm	7.55lbs
J	73.34mm	10.27lbs
K	69.63mm	8.7lbs.
L	73.51mm	10.73lbs
BY DEPTH: (1. surface, 5 bottom)		
A 1.	43.25mm	0
2.	64.29mm	3.72lbs.
3.	80.73mm	7.48lbs.
4.	83.09mm	8.72lbs.
5.	88.92mm	10.46lbs.
B 1.	40.04mm	0
2.	69.57mm	3.71lbs.
3.	81.48mm	8.09lbs.
4.	87.02mm	9.57lbs.
5.	91.15mm	11.17lbs.
C 1.	36.31mm	0
2.	68.71mm	3.36lbs.
3.	80.46mm	7.37lbs.
4.	85.66mm	9.48lbs.
5.	87.84mm	9.35lbs.

	SHELL LENGTH	MEAT WEIGHT
D 1.	40.63mm	0
2.	69.19mm	3.69lbs.
3.	83.82mm	7.55lbs.
4.	82.86mm	10.01lbs.
5.	90.29mm	10.93lbs.
E 1.	43.96mm	0
2.	67.26mm	3.54lbs.
3.	79.61mm	9.45lbs.
4.	83.16mm	10.17lbs.
5.	86.71mm	10.67lbs.
F 1.	42.95mm	0
2.	47.16mm	0
3.	82.77mm	10.87lbs.
4.	90.02mm	8.10lbs.
5.	95.38mm	11.38lbs.
G 1.	40.67mm	0
2.	76.94mm	3.31lbs.
3.	88.28mm	5.58lbs.
4.	94.60mm	9.67lbs.
5.	90.22mm	11.43lbs.
H 1.	46.60mm	0
2.	75.64mm	3.96lbs.
3.	84.90mm	7.85lbs.
4.	89.45mm	9.54lbs.
5.	87.88mm	8.47lbs.
I 1.	41.48mm	0
2.	75.95mm	4.29lbs.
3.	88.65mm	9.33lbs.
4.	89.85mm	8.79lbs.
5.	89.59mm	7.78lbs.

	SHELL LENGTH	MEAT WEIGHT
J 1.	41.44mm	0
2.	62.10mm	0
3.	82.16mm	9.45lbs.
4.	86.77mm	9.72lbs.
5.	94.23mm	11.60lbs.
K1.	43.14mm	0
2.	39.61mm	0
3.	84.40mm	7.99lbs.
4.	86.93mm	9.51lbs.
5.	94.08mm	8.65lbs.
L 1.	43.94mm	0
2.	51.92mm	0
3.	87.35mm	10.69lbs.
4.	92.72mm	11.43lbs.
5.	91.63mm	10.06lbs.

FIGURE # 3

Actual Shell Length and Meat Weight for the 3' X 4' X 6" (2 Bag Trays)

	SHELL LENGTH	MEAT WEIGHT
By Compartment:		
M 1.	77.20mm	3.98lbs.
2.	75.37mm	7.53lbs.
N 1.	72.89mm	6.83lbs.
2.	74.68mm	5.94lbs.
O 1.	73.59mm	5.97lbs.
2.	75.25mm	6.12lbs.
P 1.	76.26mm	6.40lbs.
2.	76.54mm	6.08lbs.
Q 1.	72.77mm	6.57lbs.
2.	75.20mm	6.61lbs.
R 1.	71.44mm	7.52lbs.
2.	72.30mm	8.28lbs.
By Depth: (1. surface, 5 bottom)		
M 1		
1.	44.99mm	0
2.	73.57mm	2.41lbs.
3.	89.13mm	4.73lbs.
4.	87.36mm	5.61lbs.
5.	90.96mm	7.16lbs.

	SHELL LENGTH	MEAT WEIGHT
M 2		
1.	41.64mm	0
2.	73.68mm	3.64lbs.
3.	85.78mm	8.32lbs.
4.	89.52mm	10.81lbs.
5.	86.22mm	7.29lbs.
N 1		
1.	42.71mm	0
2.	73.87mm	7.07lbs.
3.	80.77mm	7.93lbs.
4.	83.08mm	6.95lbs.
5.	84.01mm	5.36lbs.
N 2		
1.	39.97mm	0
2.	77.99mm	4.51lbs.
3.	83.60mm	6.61lbs.
4.	87.97mm	6.16lbs.
5.	83.89mm	6.49lbs.
O 1		
1.	38.30mm	0
2.	71.55mm	2.27lbs.
3.	82.64mm	8.95lbs.
4.	85.78mm	5.89lbs
5.	89.69mm	6.75lbs.
O 2		
1.	46.89mm	0
2.	72.53mm	4.17lbs.
3.	86.88mm	7.91lbs.
4.	83.95mm	5.70lbs.
5.	86.00mm	6.69lbs.
P 1		
1.	46.39mm	0
2.	70.61mm	3.82lbs.
3.	84.60mm	7.89lbs.
4.	87.95mm	6.92lbs
5.	91.77mm	6.96lbs.

	SHELL LENGTH	MEAT WEIGHT
P 2		
1.	44.90mm	0
2.	77.34mm	4.27lbs.
3.	91.48mm	6.66lbs
4.	86.38mm	6.53lbs.
5.	82.62mm	6.87lbs.
Q 1		
1.	38.50mm	0
2.	70.18mm	3.76lbs.
3.	78.00mm	7.63lbs.
4.	83.37mm	6.65lbs.
5.	93.81mm	8.25lbs.
Q 2		
1.	39.79mm	0
2.	75.19mm	2.36lbs.
3.	82.19mm	7.83lbs.
4.	88.00mm	7.04lbs.
5.	90.81mm	9.19lbs.
R 1		
1.	39.96mm	0
2.	38.93mm	0
3.	86.39mm	7.16lbs.
4.	92.87mm	7.03lbs.
5.	99.05mm	8.37lbs.
R 2		
1.	46.66mm	0
2.	41.14mm	0
3.	85.71mm	5.92lbs.
4.	91.42mm	9.23lbs.
5.	96.59mm	9.68lbs.

FIGURE # 4

Average Shell Length for the 3' X 4' X 6" (2 Bag Trays) and
40" X 20" X 4' (5 Bag Trays)

SHELL LENGTH

BY DEPTH:	40' X 20" X 4' (5 BAG TRAYS)	3' X 4' X 6" (2 BAG TRAYS)
Surface	42.03mm	42.56mm
2nd Down	62.07mm	68.05mm
3rd Down	84.24mm	84.76mm
4th Down	89.19mm	87.30mm
5th Down	91.22mm	89.62mm

Figure #5

Average Meat Yield for the 3' X 4' X 6" (2 Bag Trays) and
40" X 20" X 4' (5 Bag Trays)

	MEAT WEIGHT	
BY DEPTH:		
Surface	0	0
2nd Down	3.70lbs.	3.83lbs.
3rd Down	8.47lbs.	6.71lbs.
4th Down	9.56lbs.	7.29lbs.
5th Down	10.16lbs	7.42lbs.

Figure #6

Total Meat Weight

40" X 20" X 4' (5 Bag Trays)	3' X 4' X 6" (2 Bag Trays)
367.94 Lbs.	299.40 Lbs.